Production of Polygons

Key Stage: 2

Strand:

Mathematics: Measures (Learning Unit: 5M-E1 Angle (degree))

General Studies: Science and Technology in Everyday Life

Objectives:

(i) Appreciate patterns in numbers and shapes

(ii) Consolidate the ability of using coding software

Prerequisite Knowledge:

(i) A right angle is 90°

(ii) Understand the basic usage of coding software

Related Website: https://scratch.mit.edu/

Description of the Activity:

Activity 1

1. The teacher asks students to code for drawing a square (as shown in Figure 1). After coding, students should run the scripts and make correction if necessary.
2. The teacher discusses with students the outcome of different scripts.

(Figure 1)

When  is pressed, the set of commands will be run.

Pen down: show the trace of the pen

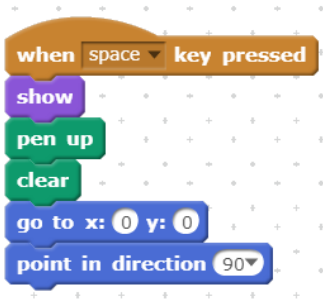
Move: move certain steps

Turn left: turn the sprite to the left

Hide: hide the sprite for observing the figure

Note for Teachers:

For convenience, the teacher may discuss with students on setting the same starting point (for example, the centre of the stage (x:0, y:0))and direction (for example, as shown in Figure 2) of the pen at each trial .



(Figure 2)

When the space key is pressed, run the set of commands (to reset the initial position and direction).
Show: show the sprite
Pen up: no drawing will be made
Clear: clear all the trace
Go to: set the starting position
Point in direction: set the starting direction of the sprite

Activity 2

The teacher discusses with students on using the command "repeat" for simpler scripts (as shown in Figure 3).

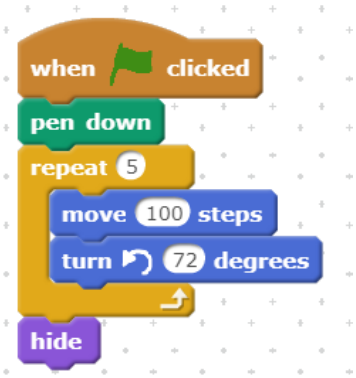
(Figure 3)

When  is clicked, run the set of commands.

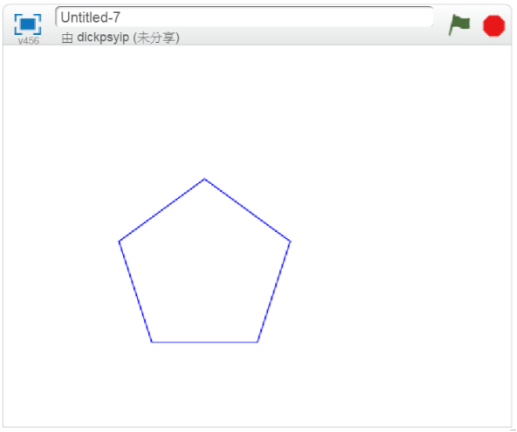
Pen down: show the trace of the pen
Move: move certain steps
Turn: turn the sprite to 90˚ left
Hide: hide the sprite for observing the shape

Activity 3

1. The teacher asks students to code for drawing a pentagon.
2. The teacher discusses with students and guides them through repeated trials to find the angle for each turn.
3. Examples and outcomes are shown in Figure 4 and 5 respectively.



(Figure 4)



(Figure 5)

Questions for discussion:

1. When drawing a square, each turn is 90°. When drawing a pentagon, should the turning angle be larger, or be smaller?
2. How many times should the scripts be repeated?

Note for Teachers:

Apart from calculation, students can edit and run the scripts, and observe the outcome to find the turning angles by trial and error.

Activity 4

1. The teacher asks students to code for drawing hexagons and octagons.
2. The teacher guides the students to use the above results to discover the relations between the numbers of sides and the turning angles.

Polygons	No. of sides	Turning angles	No. of sides × turning angle
Quadrilateral	4	90°	360°
Pentagon	5	72°	360°
Hexagon	6	60°	360°
Octagon	8	45°	360°